233. (June, 1915.) Proposed by V. M. SPUNAR, Chicago, Illinois.

Solve in rational numbers $x^2 + y^2 = a^2$, $xy = m/n$, when m and n are integers and relatively prime to each other.

SOLUTION BY A. H. HOLMES, Brunswick, Maine.

Putting $x = (p^2 - q^2)/(2p \pm 2q + 1)$, $y = (2pq)/(2p \pm 2q + 1)$, we shall have

$$a = (p^2 + q^2)/(2p \pm 2q + 1), \qquad m = 2pq(p^2 - q^2),$$

and $n = (2p \pm 2q + 1)^2$ except in the cases where $p = q + 1, 2q + 1$, or $5q + 1$, in which cases $n = 2p \pm 2q + 1$.

For smallest values put $q = 1$, $p = 2$, using the minus sign of the denominator. Then $x = 1$, $y = 4/3$, $a = 5/3$, $m = 4$, and $n = 3$.

Also solved by H. N. CARLETON.

QUESTIONS AND DISCUSSIONS.

SEND ALL COMMUNICATIONS TO U. G. MITCHELL, University of Kansas, Lawrence.

DISCUSSIONS.

I. RELATING TO AN INSTRUCTIVE PROBLEM IN ATTRACTION.

BY EDWIN BIDWELL WILSON, Massachusetts Institute of Technology.

In B. O. Pierce's *Newtonian Potential Function* (3d ed.) there is found on page 28 this exercise:

Show that the attraction at the focus of a segment of a paraboloid of revolution bounded by a plane perpendicular to the axis at a distance b from the vertex is of the form $4\pi\rho a \log(1 + b/a)$.

This problem is also found in other texts. The answer is very easy to get; it is also wrong. One way in which the answer may be found is this:

The attraction of a disc of mass M and radius r at a point on its axis at a distance c from the center is

$$\frac{2M}{r^2}\left(1 - \frac{c}{\sqrt{c^2 + r^2}}\right).$$

If the equation of the revolved parabola is $4ay = x^2$, the attraction of a segment at the focus is

$$\frac{2\pi\rho \cdot 4ay}{4ay}\left(1 - \frac{y - a}{\sqrt{(y - a)^2 + 4ay}}\right)dy,$$

and the total attraction is

$$A = 2\pi\rho \int_0^b \left(1 - \frac{y - a}{\sqrt{(y + a)^2}}\right)dy.$$

To the careless person this gives

$$A = 2\pi\rho \int_0^b \frac{2ady}{y + a} = 4\pi\rho a \log(1 + b/a)$$